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THE PSYCHOLOGICAL RECORD

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CONTENTS

Interbehavioral Psychology and Scientific Analysis of Data and Operations: J. R. Kantor 1

A Book Review: Inquiry into Inquiries by Arthur F. Bentley: Reviewed by Paul T. Mountjoy 6

Three Questions About Experimental Extinction: Stanley C. Ratner 9

News and Notes 11

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INTERBEHAVIORAL PSYCHOLOGY AND SCIENTIFIC ANALYSIS OF DATA AND OPERATIONS

J. R. Kantor

Indiana University

Psychology, along with the other sciences, has reached a high level of operational and postulational development. Like the other sciences, too, it has broadened its experimental range while achieving an elevated peak of technical proficiency. In addition to all this, psychology as the basic science of human and infrahuman performances occupies a favored position with respect to problems of scientific behavior. Despite this enormous potential, psychology no more than the other sciences has yet succeeded in analyzing scientific situations. Psychologists still do not consistently distinguish (a) things and events as the raw materials of science, (b) reactions to events and (c) the construct products of interbehavior with events.

Here are a few sample results of improperly analyzing the events studied and of failing adequately to evaluate the constructs developed for referring to, describing and interpreting those events and the investigative procedures by which they are studied: (a) Qualities of things are still confused with reactions to them, as in the doctrines of sensation and experience. Descriptive constructs are thus substituted for stimulus objects. A more behavioristic example is the dogma of asymmetry according to which perceiving or learning is reduced to actions of an organism indifferently instigated to perform responses. (b) Constructs are reified to substitute both for reactions and stimulus objects. For example, hypothetical entities are made to intervene between stimuli and responses, while performances are regarded merely as indicators of occult powers and processes.

It is not a valid argument here that practical investigative manipulations suffer little from such confusions. For are not all investigative operations simply means to achieve an effective understanding of events, whether or not subsequent prediction and control are practiced?

How can we account for so unsatisfactory a scientific situation? What lies at the basis of the circumstance that excellent operational and postulational designs have not been satisfactorily executed? There is hardly a better answer than to point out that psychologists have not been able to overcome the pressure of standard scientific traditions. Hence scientific operations have been treated as manipulations without reference to the actual events that set investigative problems and guide the details of research. Postulation likewise has not penetrated to the interbehavioral core, but has remained on the level of traditional epistemology.

As an effort to overcome this predicament we suggest an interbehavioral analysis of scientific data and operations. For expository convenience we locate the various factors of scientific enterprises

on a hierarchy of developmental levels.

I. Existence-Occurrence Level

This is the level of happenings which may or may not involve an observer or his reactions. The things and events may have existed or occurred prior to the evolution of human or even infrahuman organisms. Such events are therefore not dependent for their existence upon any observation. When they do come into the observational range they are discovered or inferred from related events.[1]

Things and events on level I are indefinitely varied in type and form. They may be classified as (a) physiochemical: lodestones, chunks of amber, fossils, astronomical bodies and the actions of any or all of these things; (b) biological: animals, plants and their behavior; (c) psychological: historical interbehavior of organisms with other organisms or inorganic objects; (d) cultural: cave drawings and paintings, social organization, customs, manner, ceremonies, industrial and domestic techniques, etc. These four types of data may be represented in the following diagram (Fig. 1):

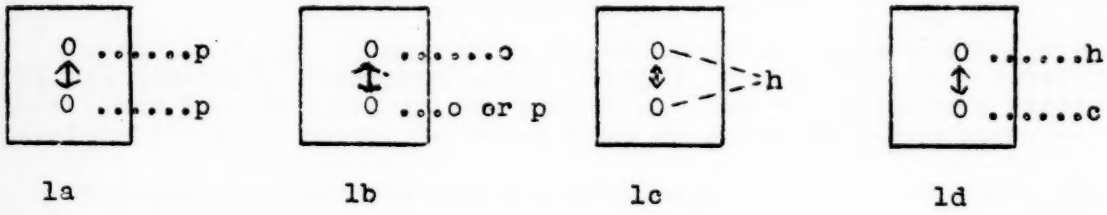

Figure 1

Fig. 1: (a) Interbehavior of 2 or more inorganic or physiochemical things; (b) Interbehavior of 2 organisms or 1 organism with 1 or more organisms or physiochemical things; (c) Interbehavior based on prior interbehavior (historical) without stress of localized structures of participating objects; (d) Interbehavior of human organism with institutional objects or events (cultural).

Events may occur entirely outside or within the bounds of human action. We differentiate accordingly between (1) pristine and (2) contrived things and events. The former hardly call for further comment. Among the latter are products of behavior--for example, assimilation and excretion products of organisms, the changes wrought in things through the contrivance of organisms--for example, (a) destruction or transformation of materials and (b) the synthesis of chemical products. In (a) emphasis is put upon the altered things; in (b) produced things are stressed. Both situations consist merely of relatively different factors.

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1. The same situation prevails when we are concerned with local and immediate events rather than with primordial ones.

Some explication and justification are required here of the thing-event distinction. Inasmuch as every thing, including its qualities, characteristics, traits or properties, exists only in a narrow or broad complex of movements or other changes it is an event. We may then consider events as fields of related factors; things and events are always items in larger field events. A chemical element, even an electron as a factor in an ionization field, may be called a thing.

Adopting the model of interbehavioral psychology we can keep the event or stimulus-object factor distinct from any constructional imposition. Whether we deal with pristine or contrived thingevents[1] we are concerned with a field of interbehaving factors. This thingevent may be, as in physiochemical situations, the mutual and reciprocal action and reaction of inorganic bodies or, as in a biological situation, the interbehavior of a virus and a bacterium. But even where human organisms are included there is no room for any illegitimately added construction about a "mental" creation of the things or objects and their qualities. Such impositions are simply verbal or nonverbal performances. All activities occurring in the various fields are in no sense dependent for their occurrence upon any "knowing" of them.

II. Observation Event Level

Events on level II may be regarded as merely more complex event fields than those described under level I, and accordingly developments from it, inasmuch as the events on level II include a first-level pristine or contrived event plus an observer's response.

Observation responses cover a wide range of interbehavior, all of which is qualitatively continuous and homogeneous in character. The more obvious types are describable as definitely discriminating or noticing some object or event, referring to it or describing it with lesser or greater detail. It must be emphasized that such interbehaviors are continuous with, and outgrowths of, such simpler actions as approaching or backing away from the stimulus object on the basis of previous contacts.

The observation event level is illustrated by taking any item of level I as the stimulus object for an interbehavior with an observer. In case level I event belongs in the psychological domain, the response may be labeled R_O; thus the observer's response is denominated R_1 as in the accompanying diagram (Fig. 2). Notice the necessity for two double-headed arrows.

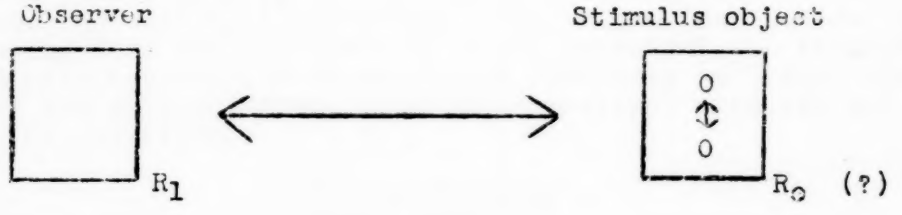

Figure 2

1. We adopt the term thingevent to avoid constant repetition of the phrase things and events.

III. Investigation Event Level

The primary differentia of this level is that the interbehavior with the original stimulus object event consists of planned manipulations. This interbehavior is describable as analysis and synthesis, conversion and sometimes destruction.

As distinguished from responses on level II the investigator's activities are definitely more persistent and directed toward the discovery of interesting or important properties and relations.

In consonance with these facts, and as a consequence of them, the investigator produces complex constructs, propositions, curves, diagrams and equations to summarize his findings and to guide him to further operations upon the same or similar things and events.

IV. First Analytic Event Level

Interbehavior on this level becomes so complicated that the analyst's stimulus object includes the behavior of the level III investigator. The analyst's responses consist of critically dissecting and interpreting the investigator's interbehavior, with direct reference to the thingevents he manipulates or measures and the fittingness of his techniques and instruments to deal with them. The accompanying diagram indicates that on this level we have three double-headed arrows. The analyst's response may be numbered R_3, as in Fig. 3.

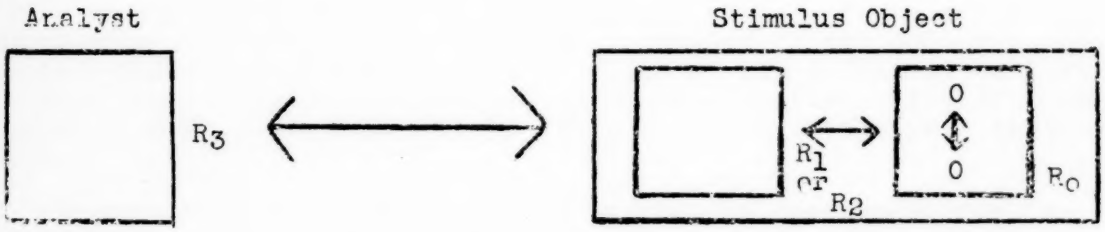

Figure 3

Although the analyst's interbehavior appears to be far removed from original events this is not so. As we have indicated, the levels are continuous as well as hierarchical. This means that logical constructs ensuing from the analyst's critical appraisal are invariably grounded in pristine events--events which decidedly influence the responses of the entire series, even when construct products are nondescriptive or falsifying.

V. Second Analytic Event Level

The present level not only constitutes an extension and continuation of level IV but also marks the proper end of the series. Schem-

atically the interbehavior here consists of responses (symbolized as R_4) to analytic event fields as stimulus objects. R_4 responses, therefore, are the actions of a logician in contact with a scientist's investigative interbehavior. This situation, which must include four double-headed arrows, is diagrammed as follows (Fig. 4):

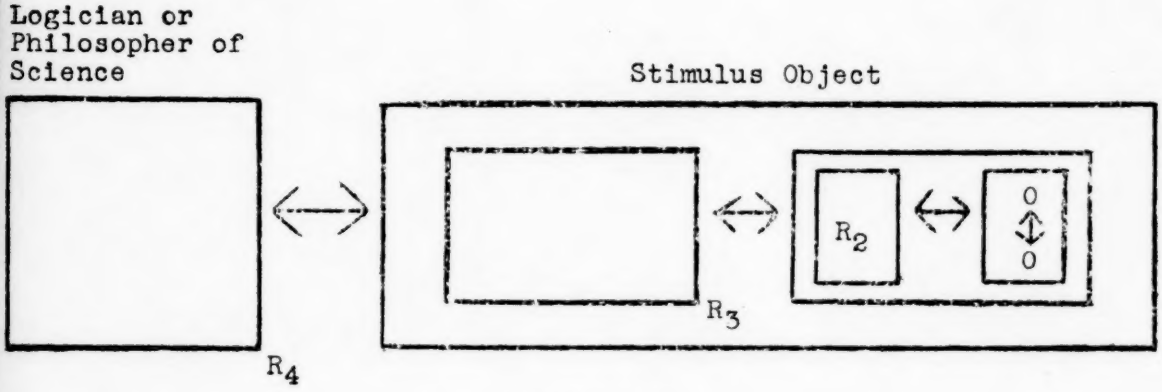

Figure 4

R_4 activities performed by the second-level analyst occur in the most complex situations. The logician definitely takes into account the local and more general cultural institutions which influence the responses on all levels.

Whereas observers and investigators on levels II and III may be fully alert to the characteristics and properties of the things with which they interact, they may not be cognizant of the cultural conditions influencing their responses. This is all different on level V. Here opportunities are available for emancipating scientific investigation from the ill effects of obstructing traditional institutions.

In sum: When level V is reached the scientific enterprise is evaluated not merely as a manipulative or operational enterprise, but in addition full cognizance is taken of the various levels of postulation. The logician of science uses as criteria the metasystems and cultural institutions which constitute the inevitable auspices under which all scientific work is done.[1]

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1 Cf. Kantor, The Logic of Modern Science. Bloomington, Principia, 1953, ch. 2.

A BOOK REVIEW

Paul T. Mountjoy

Sweet Briar College

Inquiry into inquiries. By Arthur F. Bentley. Edited by Sidney Ratner. Boston: The Beacon Press, 1954. Pp. xvi, 365. $ 6.00.

This collection of essays represents not only an attempt to summarize both the intellectual development and the present position of Arthur F. Bentley, but also to make available previously unpublished material of the author. It appears to the reviewer that Sidney Ratner has succeeded in achieving these objectives as the dates of the selections range from 1910 to 1950 and seven of the twenty essays (93 pages out of a total of 352) had never been published.

The book itself is quite pleasing in appearance and includes an orientative introduction by the editor which contains a short biographical sketch. A complete bibliography of Bentley's published works serves to round out the volume for the reader who would like to delve further into the materials from which this collection has been drawn as a sample. Two comprehensive indices, one of names and one of subjects, greatly increase the utility of a volume which must because of its very nature be somewhat lacking in systematic organization.

From the point of view of the professional psychologist the appeal and relevance of the individual essays will undoubtedly be quite varied. For this reason the reviewer has attempted to dichotomize the contents into (1) those which appear to possess intrinsic appeal to psychologists because they deal largely with psychology as such and (2) those which deal largely with the more general problems of the philosophy of science. It must be remembered that this division has been made rather arbitrarily for purposes of review since Bentley's interest in the philosophy of science consists of an attempt to develop a non-dualistic epistemology. Quite obviously, the problems involved in rejecting dualistic epistemology are central to the interest of objective psychologists. In addition, the major concern of Bentley with psychology is criticism of systems of psychology from the point of view of scientific methodology.

(1) Eleven essays may be regarded as dealing with psychology as such. In "A Sociological Critique of Behaviorism" the social factors of behavior are emphasized. "Situational vs. Psychological Theories of Behavior," "Observable Behaviors" and "The Factual Space and Time of Behavior" state rather clearly that psychology can be an objective science. "The Human Skin: Philosophy's Last Line of Defence," "Some Logical Considerations Concerning Professor Lewis's 'Mind'" and "Muscle-Structured Psychology" deal quite sharply with the ever present nonsense of "Inner" and "Outer" realms of existence. In "Physicists and Fairies" Bentley indicates the medieval status of the systems of psychology utilized as epistemological foundations by non-psychologists such as Bridgman, and accuses him of dealing "mostly

with fairies, sprites and spooks." The rigorous analysis presented in "The Fiction of 'Retinal Image'" (previously unpublished) might be regarded as being worth the price of the book since it establishes a starting place for an objective analysis of vision. "The Jamesian Datum" presents an argument that James was moving toward an epistemological position which would have been quite in line with Bentley's own position. In "Memoranda on a Program of Research into Language" it is stated that language is an event which must be studied in terms of the complete event and not in terms of a meaning localized inside the organism.

(2) Nine essays deal primarily with the philosophy of science. "Knowledge and Society," "Remarks on Method in the Study of Society," "New Ways and Old Ways to Talk About Men" and "Sociology and Mathematics" will probably be only of limited interest to the professional psychologist. "The Positive and the Logical" and "Logic and Logical Behavior" reveal the development which culminated in collaboration with Dewey on Knowing and the Known. "An Aid to Puzzled Critics," "Carnap's 'Truth' vs. Kaufmann's 'True'" and "Kennetic Inquiry" may be regarded as attempts to clarify and further develop the non-dualistic epistemological formulations of Knowing and the Known.

The preceeding description should indicate that ultimately the utility and evaluation of this volume depend in a large degree upon the individual reader. For example, some readers may interpret the tone of certain references to Bloomfield (pp. 264-5), Lashley (p. 284) and Pavlov (p. 263) as evidence that Bentley has failed to rid himself completely of dualistic shackles. This reviewer feels, however, that study of the volume will be rewarding. No one can possibly read it without becoming impressed by the importance of the continual questioning of postulational bases. In fact, despite the frequently caustic expression of criticism, the position expounded might be characterized as one of "Postulational Humility." Most professional psychologists would profit from absorbing some of this humility concerning their own postulational bases.

Inquiry Into Inquiries is one of Bentley's finest contributions. His is a busy life of achievement which can be matched by only a few fortunate human beings. Perhaps the most striking way of indicating Bentley's stature is to quote from his book The Process of Government:

"If we limit the term activity to the motions of the body - the hands and feet and so forth - conceived of as more or less detached from the 'man himself,' and external to him, we do not get good material to study...it must be regarded as the activity of the human being taken as a whole, as a person in society..." (p. 184).

" If we should follow this anger activity backward in time, we should find it a complex of certain other activities, which, when stated with sufficient completeness, would state the anger activity itself with no need of any soul-plus to add to it." (pp. 187-8)

The importance of these statements lies not merely in their rejection of metaphysical dualism and emphasis of the importance of

including stimulations in a description of reactions, but in the fact that they were first published in 1908. It is the reviewer's opinion that any professional psychologist who consults Bentley will find him to be of great assistance in the formulation of an objective system of psychology.

THREE QUESTIONS ABOUT EXPERIMENTAL EXTINCTION

Stanley C. Ratner

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The concept of extinction used by contemporary workers in instrumental learning will be examined in terms of three questions: (1) what is the event underlying the concept? (2) what do behaviorists say about it? (3) can interbehaviorists contribute to understanding and describing it? Consideration of each of these questions will be suggestive rather than exhaustive.

A description of extinction flows most easily in behavioristic terms since most of the work has been done with it in that system. The concept of extinction implies that organisms (Os) have first learned a sequence of responses in a controlled situation in which they received some "reward object," e. g., food or water, at the completion of each sequence. Removing this "reward object" is the defining operation for extinction, although other factors can necessarily affect the behavior. When this "reward object" is removed O's behaviors gradually change from that observed at the end of learning to sitting or sleeping in the controlled situation. This description is drawn from animal work. Analogous human studies, however, have been performed.

The importance of so-called "extinction of learned responses" is that it is one of the few relatively permanent ways to stop O from doing something when O can not be removed from the situation, e. g., a child in its home.

Since extinction type events have been systematically observed as early as Pavlov's work in classical conditioning and have been verified in many different instrumental learning situations, behavior theorists rose to explain the events. Two major theories of extinction are current, although each has themes and variations. Inhibition type theory suggested by Pavlov and modified by Hull explains extinction in terms of building up and dissipating physiological-like inhibitions which counteract the previously learned response tendencies. These inhibitions are assigned the status of intervening variables. Interference theory explains extinction in terms of O learning other responses in the situation when there is no "reward object." These other responses are performed in the place of the other previously learned responses, since the stimulus situation is now changed. In spite of this aborted version of interference theory, it is evident that it is more nearly derived from the event to which it refers than is inhibition theory. Thus interference should be more testable and also better science according to interbehavioral psychology. It is interesting to note, however, that interference workers have been less active experimentally than inhibition workers.

Although interbehaviorists have not made analyses of details of these learning events they, among other things, have made their meta-

system explicit and useful. In particular, there are two points drawn with some liberty from the metasystem which are useful in analyzing extinction. One point is an emphasis on the event for both experimentation and theory construction. The other is a holistic or field emphasis. Using one and/or both of these notions, some ignorances about the event become important. What does O do during extinction? Is there a steady deceleration of the previously learned sequence; a return to responses first made in the situation, or what? The writer worked on this problem at some length with rats in Skinner boxes and found, among other things, that extinction is not a gradual deceleration of the previously learned sequence but a disintegration of the sequence. This analysis was made possible by observing two activities in the Skinner box rather than the traditional bar press alone. Some recent unpublished studies have also gone beyond the bar press. Another investigation suggested in the context of an interbehavioral metasystem involved study of the effects of extinction of part of the sequence before extinction of the entire sequence. That is, after learning, Os were free to explore part of the situation without any "reward objects" before the entire situation was opened. The holistic type protopostulate led the writer to correctly predict that this partial extinction would affect the entire sequence. A related study is now underway with M. R. Denny to check this prediction with rats in a runway. In this study groups of Os explore various particular parts of the runway after learning and before extinction of the entire sequence. Seward and Levy, also in a holistic type tradition, tried this by allowing Os to explore the reward area but their data are controversial and apply only to the reward box.

While extinction has not been publicly described in interbehavioral terms, it seems clear that removing the "reward object" can be considered as changing the behavior segment which involves this stimulus object which changes its function and the response and its function. One question that occurs is what behavior segment has been changed or, in other words, how does one circumscribe the segment for analysis? The case of the rat in the runway can readily be described many ways, e. g., in terms of three behavior segments with stimulus objects of start box, alley and reward box with food, or in terms of one segment with the stimulus object of the entire runway. Another question arises when one attempts to analyze the event using the concepts of stimulus and response functions. Although there is an intuitive appeal in these concepts as soon as there is some feeling for the interbehavioral metasystem, this is not sufficient for specific application of them in ongoing experimental settings. Thus, some clarification of the definitions and rules for applying these concepts would make it easier for non-experts to use them.

In summary, then, this paper has given an overview of extinction as developed in behavioristic learning terms and has drawn attention to the theoretical and possible social significance of the events. The role of the interbehavioral metasystem in investigation of extinction was reported and a request was made for clarification of some interbehavioral constructs in the context of extinction or in the context of almost any specific events.

NEWS AND NOTES

In this space will be printed short theoretical and research notes, comments on past issues, and news of the professional doings of subscribers. Subscribers are requested to submit such items not later than 30 days prior to the scheduled appearance of the following issue. The next issue is scheduled for April 10th.

NEWS

Dr. and Mrs. Kantor depart for Europe on January 19th. Dr. Kantor writes that a European residence of 6-7 months is planned.

Dr. Paul R. Fuller has changed positions and is now a member of the Atlanta office of Rohrer, Hibler and Replogle.